Sexually Transmitted Infections
Epidemiology

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Outline

- Introduction, Slides: 3 - 6
- Global and Regional STI Burden, Slides: 7 - 28
- STI Epidemiology: country specific examples, Slides: 29 - 43
- STI epidemiology: populations, transmission, risk, Slides: 44 - 46
- WHO STI Library, Slides: 47 - 50
... and, since BC, the STIs epidemic
Sexually Transmitted Infections, STIs

There are about 30 **STIs** or disease syndromes that result from STIs
STIs

Bacteria
- Gonorrhea (*Neisseria gonorrhoeae*)
- Chlamydia (*Chlamydia trachomatis*)
- Syphilis (*Treponema pallidum*)
- Chancroid (*Haemophilus ducreyi*)

Viruses
- Genital warts and cervical—mainly—cancer (human papillomavirus)
- Genital herpes (herpes simplex virus)
- Hepatitis B (hepatitis B virus)

Parasites
- Trichomoniasis (*Trichomonas vaginalis*)
- Pubic lice (*Phthirius pubis*)
Since the 80’s: HIV, the new, devastating, STI
Estimated new cases of curable STIs among adults, 1999

Global Total 340 million
Syphilis 12, Gonorrhoea 62, Chlamydia 92 and Trichomoniasis 174 million
Global estimates of incidence and prevalence of selected sexually transmitted infections: *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, Syphilis, and *Trichomonas vaginalis*, 2005, will be available soon.

visit RHR at: http://www.who.int/reproductive-health/
visit WHO at: www.who.int
Prevalence of syphilis among women attending antenatal care clinics at selected sites, by country, 2000 - 2002

Trends in prevalence of syphilis among attending antenatal care clinics at selected sites, by country, 1994 - 2002

We Really Do Not Know How Common Congenital Syphilis Is
We Rely on Estimating the Numbers of Pregnant Women with Syphilis

And Multiply That By Estimating the Proportion of These Women with an Affected Fetus/Infant
Use of Maternal Syphilis Seroprevalence Data to Estimate the Global Morbidity of Congenital Syphilis

- Identified all published reports of syphilis seroprevalence in pregnant women, 1997-2003
- Constructed region-specific prevalence rates for maternal syphilis
- Using three models of the proportion of these women with an affected fetus/infant, to estimate the number of foetuses/infants infected

Schmid GP, Stoner BP, Hawkes S, Broutet N. Sex Transm Dis (June 2007)
2005 WHO Estimates of maternal syphilis seroprevalence

- Data from studies done between 1997 – 2003:
  - 215 studies
  - 31 countries
  - total 431,452 women tested

- Overall prevalence was 1.76%.

- Estimation of 2,156,304 women with positive syphilis serology using regional estimate

- 95% CI= 1,559,888 - 2,751,032
Regional Estimates of Maternal Syphilis Seroprevalence

Europe Region
Seroprevalence 1.5%
Annual no. of cases 157532

Western Pacific Region
Seroprevalence rate 0.7%
Annual no. of cases 134522

Americas Region
Seroprevalence 3.9%
Annual no. of cases 539463

Africa Region
Seroprevalence 1.98%
Annual no. of cases 705725

Eastern Mediterranean Region
Seroprevalence 1.11%
Annual no. of cases 172154

South-East Asia Region
Seroprevalence 1.48%
Annual no. of cases 446909
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>A. Untreated syphilis</td>
<td>0.95*</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>B. High serologic titer (≥1:8)</td>
<td>0.73</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>C. Adverse pregnancy outcome due to syphilis**</td>
<td>0.49</td>
<td>0.65</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Global Annual No. of Congenital Syphilis Cases (calculated as 2.1 million maternal cases x A x B x C): 713,600 1,365,000 1,575,000

²Schulz K et al Genitourin Med 1987;63:320
³WHO (www.who.int)

*not included in original Watson-Jones model

**includes miscarriage / fetal loss, perinatal death, prematurity / low birthweight, neonatal infection
While Numbers Vary, and Estimates are Estimates, the Numbers of Women and Children Infected are "High"

In many parts of the world, syphilis is common
Prevalence of Gonorrhoea, Chlamydia and Trichomoniasis among FSW, at selected sites, by country, 1997-2000
Aetiology of Genital Ulcer (Chancroid and Genital Herpes) by year of study in South Africa

Diagnoses of syphilis (primary, secondary and latent in the first 2 years of infection) seen in GUM clinics, England, Scotland and Wales, 1931 to 2000*

*Equivalent Scottish data are not available prior to 1945 and for 2000
*As Northern Ireland data from the time period 1931 to 2000 are incomplete they have been excluded from this figure

Source: PHLS, UK
Gonorrhea and syphilis in Italy
Mandatory notifications, 1955-1999

Source: Suligo et al.
Annual incidence of gonorrhoea per 100 000 population in Nordic countries (1981 – 1996)

Source: Adler, Meheus, JEADV 2000;14:370 - 377
Late 1990s
Things are not the same anymore!
Diagnoses of infectious syphilis (primary and secondary) in GUM clinics by sex and age group, UK: 1995-2000*

*Data are unavailable from Scotland for 2000 and from N.Ireland for 1996 & 1997

Source: ESSTI/PHLS, UK
Netherlands: Gonorrhoea and syphilis, STD clinic Amsterdam (annual reports, GG&GD Amsterdam).

GO: 1999: + 46%; MSM 59% heter 16% fem 66%; 2000: + 45%; 33% 56% 72%
Lues: 1999: + 120%; MSM 333% heter 54% fem 40%; 2000: + 63% (MSM 136%)

Source: ESSTI/PHLS, UK
Trends in gonorrhoea in England and Wales, France, the Netherlands, and Sweden

**Sources:**
- England and Wales: cases of gonorrhoea seen in GUM clinics, 1991-2000
- France: trends in gonococcal infections in RENAGO laboratories, 1991-9
- Netherlands: notified cases of gonorrhoea per 100 000 inhabitants, 1976
- Sweden: number of clinically reported *Neisseria gonorrhoeae* cases, 1991-99 (adapted from Smittskyddsinstitutet (Swedish Institute for Infectious Disease Control). *Smittsamma Sjukdomar 1999.* Stockholm: Smittskyddsinstitutet, 2000)

Incidence of syphilis in the WHO EURO Region 1999/2000
Rate per 100,000 population
- Different Magnitude of Problem -
Incidence of syphilis in Belarus, Estonia, Kazakhstan, Moldova, Russia, Ukraine, 1990-2000 (rate per 100 000)
Percentage of unprotected anal intercourse among HIV-negative young (< 35 years) homosexual men (n=877), Amsterdam, 1984-1999

Source: Stolte et al. EUROSURVEILLANCE Vol. 7 No2 FEBRUARY 2002
Relative numbers (infection rate) of rectal gonorrhoea and early syphilis diagnosed among homo- and bisexual men before and after the introduction of anti HIV therapies, Amsterdam STD outpatients clinic, 1994-1999

Taux d'infection / Infection rate (%)

<table>
<thead>
<tr>
<th></th>
<th>Avant / before HAART</th>
<th>Depuis / since HAART</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gonorrhée rectale / Rectal gonorrhoea</strong></td>
<td>149 / 3770</td>
<td>401 / 7470**</td>
</tr>
<tr>
<td><strong>Syphilis</strong></td>
<td>18 / 3770</td>
<td>60 / 7470*</td>
</tr>
</tbody>
</table>

*p < .05
**p < .01

Source: Stolte et al. EUROSURVEILLANCE Vol. 7 No2 FEBRUARY 2002

First case of AIDS in 1984

100% condom initiated in 1989

100% condom completed in 1992
Clients Using Condoms and STI Cases Reported - Thailand

Source: Sentinel Serosurveillance, Division of Epidemiology, Ministry of Public Health.
## Prevalence of Syphilis in pregnancy (Thailand)

<table>
<thead>
<tr>
<th>Year</th>
<th>Prevalence</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963</td>
<td>9.70</td>
<td>Moph</td>
</tr>
<tr>
<td>1965</td>
<td>4.40</td>
<td>Siriraj (BKK)</td>
</tr>
<tr>
<td>1975</td>
<td>3.10</td>
<td>Rajvithi (BKK)</td>
</tr>
<tr>
<td>1979</td>
<td>3.00</td>
<td>Moph</td>
</tr>
<tr>
<td>1981</td>
<td>3.28</td>
<td>Siriraj (BKK)</td>
</tr>
<tr>
<td>1984</td>
<td>2.00</td>
<td>Chula (BKK)</td>
</tr>
<tr>
<td>1992</td>
<td>1.48</td>
<td>Moph (District)</td>
</tr>
<tr>
<td>1993</td>
<td>1.56</td>
<td>Moph (National)</td>
</tr>
<tr>
<td>1994</td>
<td>1.28</td>
<td>Moph (National)</td>
</tr>
<tr>
<td>1995</td>
<td>1.08</td>
<td>Moph (National)</td>
</tr>
<tr>
<td>1996</td>
<td>0.73</td>
<td>Moph (National)</td>
</tr>
<tr>
<td>1997</td>
<td>0.51</td>
<td>Moph (National)</td>
</tr>
<tr>
<td>1998</td>
<td>0.45</td>
<td>Moph (National)</td>
</tr>
</tbody>
</table>
Prevalence of HIV and STIs in sex workers, Andhra Pradesh, Kakinada India

% positive

- TV: 43.4%
- NG: 11%
- CT: 4.6%
- A. sifilide: 31.2%
- HIV: 42%
National level prevalence assessment studies:
Lao People’s Democratic Republic, 2001

Adapted from: HIV Surveillance Survey (HSS) and Sexually Transmitted Infection Period Prevalence Survey (SPPS)
National level prevalence assessment studies:
People’s Republic of China, 2000

Adapted from: Prevalence survey of STIs among female Sex Workers and Truck Drivers in China 1999-2000
National level prevalence assessment studies: Cambodia, 2002

Adapted from: Low prevalence of STIs in Cambodia supports recent behavioral and HIV prevalence trends, 2002
Cross-sectional prevalence assessment studies: Papua New Guinea, 2000

Source: Adapted from Consensus Report on STI, HIV and AIDS Epidemiology, 2000
Peru’s Ministry of Health HIV and STD Control Programme: Community Randomized Trial, 2002.

- Objective: To assess the prevalence of STD among young adults of mid-sized Peruvian cities.

- Methods: Cross-sectional survey. Household random sample of 18 to 29 year old resident of 24 Peruvian cities.

- Demographic and risk behaviour questionnaires

- STI assessed: Syphilis, HIV, Gonorrhoea and Chlamydia infection in men and women and T. vaginalis infection in women.

- Results:

<table>
<thead>
<tr>
<th></th>
<th>Chlamydia (%)</th>
<th>Gonorrhoea (%)</th>
<th>Trichomonas (%)</th>
<th>Syphilis (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urine Swabs</td>
<td>Urine Swabs</td>
<td>Swabs</td>
<td>Blood</td>
</tr>
<tr>
<td>Female</td>
<td>2.7 6.8</td>
<td>0.2 0.8</td>
<td>5.2</td>
<td>0-3.8</td>
</tr>
<tr>
<td>Male</td>
<td>4 0.3</td>
<td></td>
<td></td>
<td>0-3.4</td>
</tr>
</tbody>
</table>
In each city:

- 1 reference lab
- 2 STI clinics
- 2 antenatal clinics
- 12 to 15 industries

• Metropolitan areas
• Biennial
## STI Estimates, Brazil 2001

<table>
<thead>
<tr>
<th>STI</th>
<th>INCID. (%)</th>
<th>TOTALE NUOVE INFEZIONI</th>
<th>PREV. (%)</th>
<th>TOTALE INFEZIONI PREVALENTI</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. gonorrhoeae</td>
<td>1,82</td>
<td>1.541.800</td>
<td>0,71</td>
<td>600.600</td>
</tr>
<tr>
<td>C. trachomatis</td>
<td>2,32</td>
<td>1.967.200</td>
<td>1,92</td>
<td>1.626.600</td>
</tr>
<tr>
<td>T. vaginalis</td>
<td>5,10</td>
<td>4.326.500</td>
<td>3,40</td>
<td>2.880.700</td>
</tr>
<tr>
<td>T. pallidum</td>
<td>1,10</td>
<td>937.000</td>
<td>2,06</td>
<td>1.748.900</td>
</tr>
<tr>
<td>HSV 2</td>
<td>0,76</td>
<td>640.900</td>
<td>12,57</td>
<td>10.663.000</td>
</tr>
<tr>
<td>HPV</td>
<td>0,81</td>
<td>685.400</td>
<td>15,17</td>
<td>12.860.000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>10.098.800</strong></td>
<td><strong>30.379.800</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 74 000 STIS reported in 2002 from 5 countries of the Region

- Most reported STIs are Trichomoniasis, gonorrhoea and syphilis.

- Observed increased rate of syphilis among pregnant women in Bahrain from 0.25% in 2001 to 0.35% in 2002

- In Pakistan 78% of women are reported to have vaginal pathogenic discharge, 29.4% had pelvic tenderness, 17% had cervical ulcers, 4.5% had abdominal tenderness and 2.9% had vesicles on the genitalia

Source: Abu Dhabi Meeting, July 2003
Antimicrobial Resistance: Quinolone resistance (%)

The World Health Organization recommends that once a level of 5% resistance to an antibiotic is recognized, then that antibiotic should be removed from recommended treatment schedules for gonorrhoea.

Source: Global Atlas (CDS/WHO)
STI transmission dynamics at population level

- Core group
- Bridging population
- General population
Dynamics within specific populations & their partners

- Clients
  - Low or no risk males
- Bisexual
- FSW
- MSM
- IDUs
- Low or no risk females
Transmission dynamics model with intervention opportunities for the control of GUD and other STIs

Transmission dynamics

- Sex Workers
- Clients
- Regular partners

Strategies

- Targeted interventions
- Enhanced STI prevention & Quality Case Management

Intermediate outcome

- Increased condom use in commercial sex
- Reduced GUD prevalence
- Increased condom use in general population

Ultimate impact

- Reduced HIV and STI incidence (Reduced HIV prevalence)
Never ending story?

The past started

The present is working
Tradition exits
Progress is made
Coming…

- Updated version of the Guidelines for the management of Sexually Transmitted Infections
- Updated version of the Guidelines for the management of Sexually Transmitted Infections Surveillance

visit RHR at: http://www.who.int/reproductive-health/
visit WHO at: www.who.int